03-0984
Kar et al.
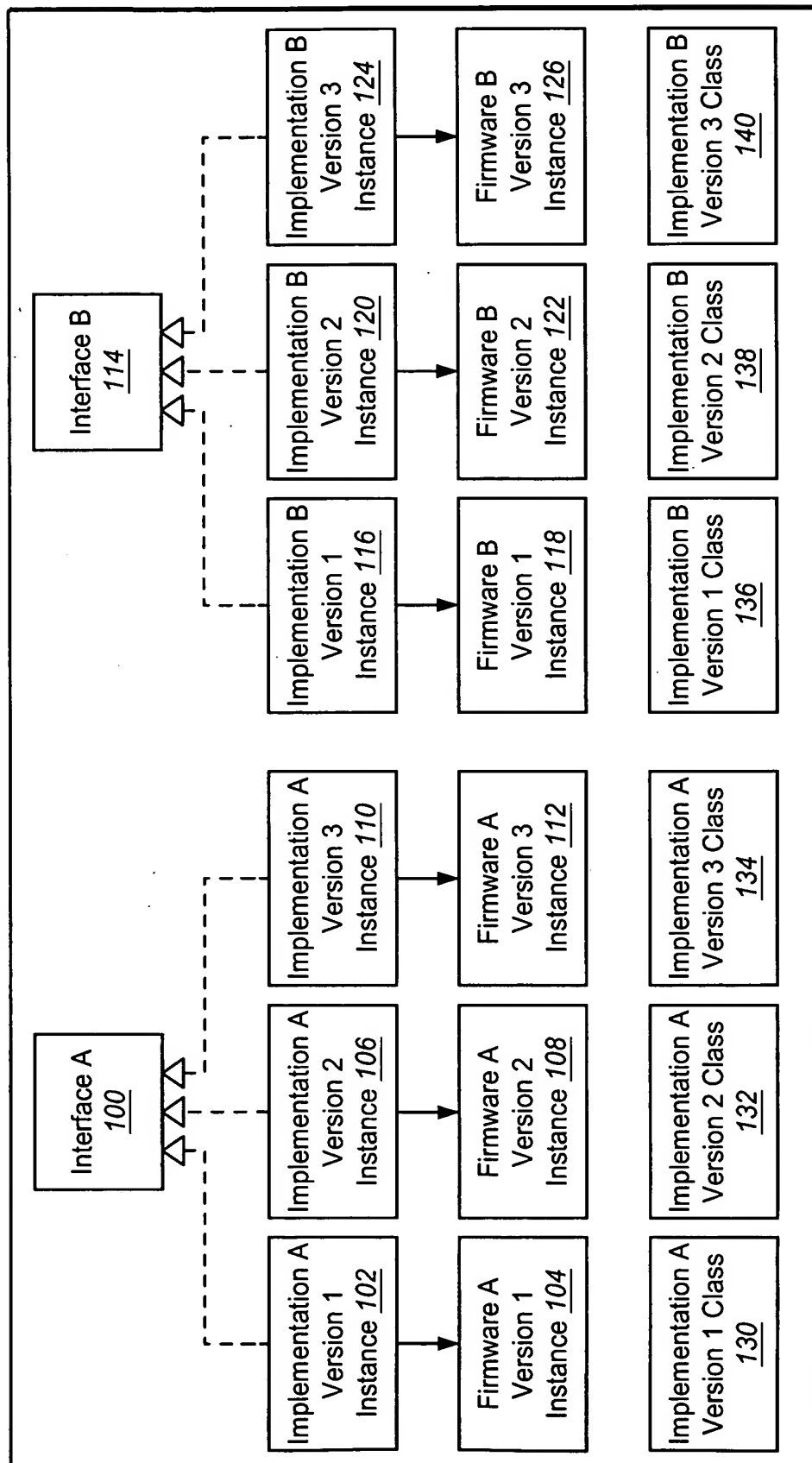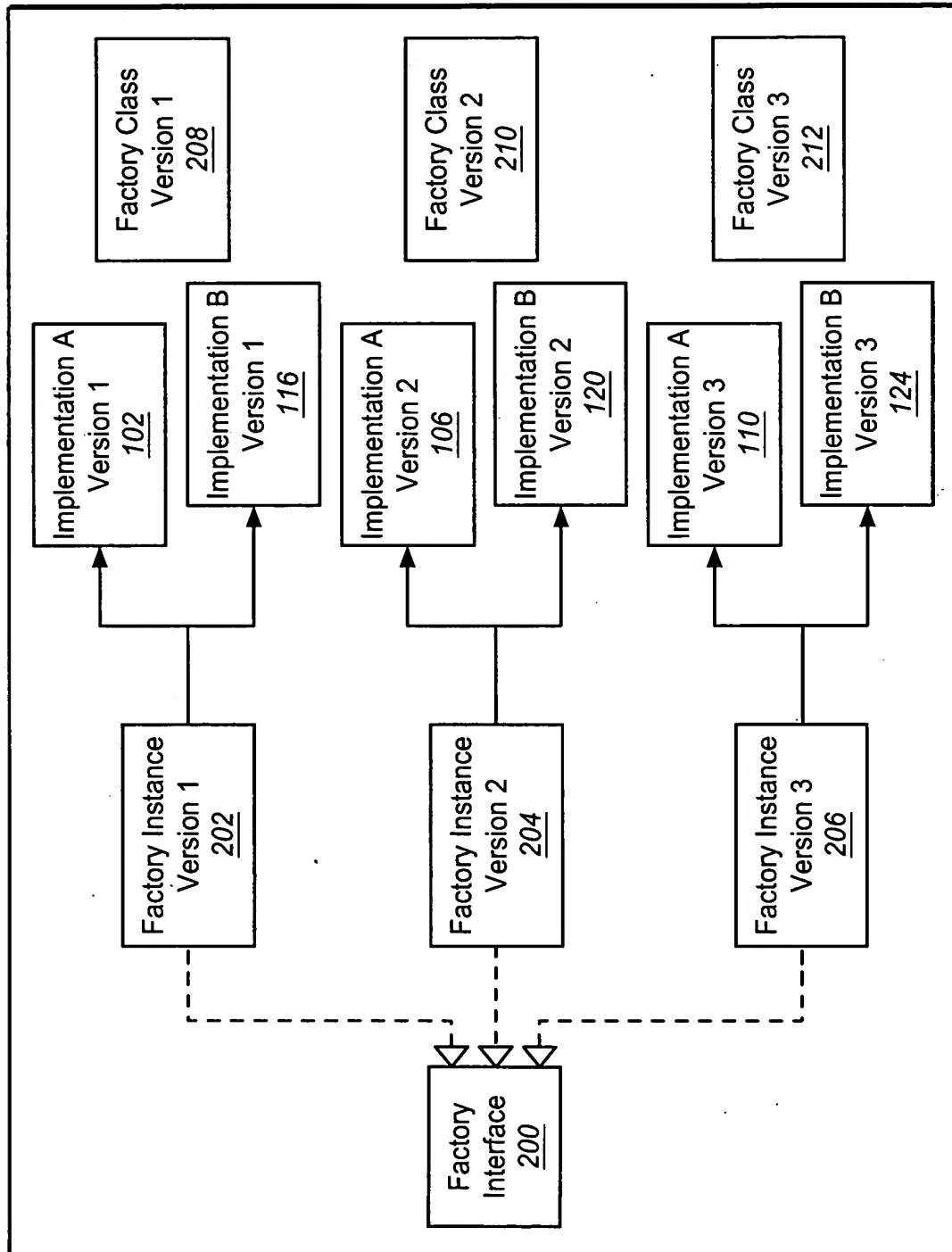Method, System, and Product for Proxy-Based Method
Translations for Multiple Different Firmware Versions

1 / 8

FIG._1 (PRIOR ART)

03-0984
Kar et al.
Method, System, and Product for Proxy-Based Method
Translations for Multiple Different Firmware Versions

2 / 8

FIG._2 (PRIOR ART)

03-0984
Kar et al.
Method, System, and Product for Proxy-Based Method
Translations for Multiple Different Firmware Versions

3 / 8

Interface Proxy Instance B3 *324* → **Interface Invocation Handler Instance B3** *325* → **Firmware B Version 3 Instance** *326*

Interface B *314*

Interface Proxy Instance B2 *320* → **Interface Invocation Handler Instance B2** *321* → **Firmware B Version 2 Instance** *322*

Interface Proxy Instance B1 *316* → **Interface Invocation Handler Instance B1** *317* → **Firmware B Version 1 Instance** *318*

Interface Invocation Handler Class *332*

Interface Proxy Instance A3 *310* → **Interface Invocation Handler Instance A3** *311* → **Firmware A Version 3 Instance** *312*

Proxy Class *330*

Interface A *300*

Interface Proxy Instance A2 *306* → **Interface Invocation Handler Instance A2** *307* → **Firmware A Version 2 Instance** *308*

Interface Proxy Instance A1 *302* → **Interface Invocation Handler Instance A1** *303* → **Firmware A Version 1 Instance** *304*

FIG._3

03-0984
Kar et al.
Method, System, and Product for Proxy-Based Method
Translations for Multiple Different Firmware Versions

4 / 8

Proxy Class 408

Factory Invocation Handler Class 410

Interface Proxy Object A1 Including Interface Invocation Handler Instance A1 302

Interface Proxy Object B1 Including Interface Invocation Handler Instance B1 316

Interface Proxy Object A2 Including Interface Invocation Handler Instance A2 306

Interface Proxy Object B2 Including Interface Invocation Handler Instance B2 320

Interface Proxy Object A3 Including Interface Invocation Handler Instance A3 310

Interface Proxy Object B3 Including Interface Invocation Handler Instance B3 324

Factory Proxy Object Version 1 Including Factory Invocation Handler Instance 1 402

Factory Proxy Object Version 2 Including Factory Invocation Handler Instance 2 404

Factory Proxy Object Version 3 Including Factory Invocation Handler Instance 3 406

Factory Interface 400

FIG._4

03-0984
Kar et al.
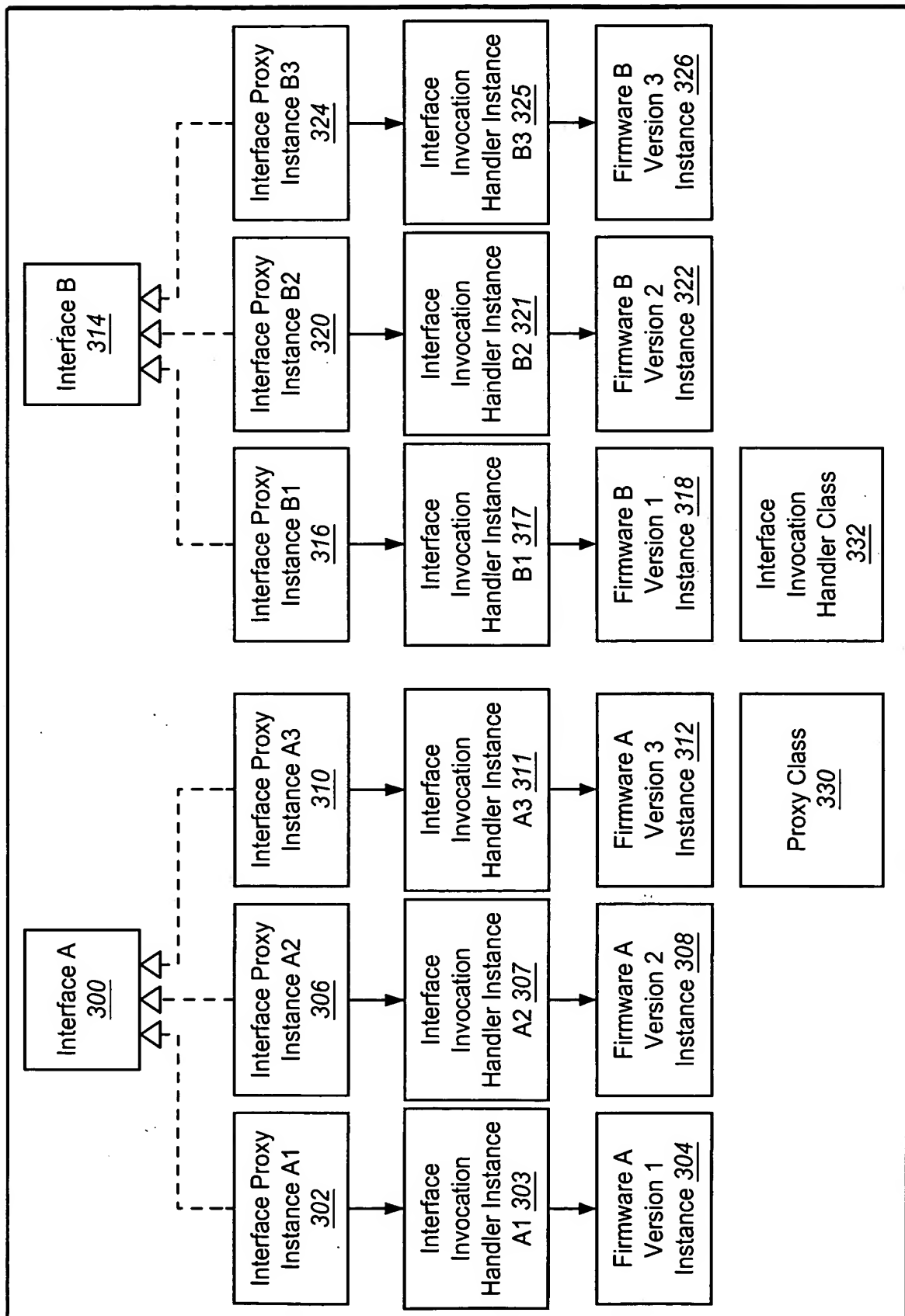Method, System, and Product for Proxy-Based Method
Translations for Multiple Different Firmware Versions

5 / 8

Start
500

Method of the Interface
is invoked by a client
on a proxy instance
502

Proxy instance
passes the method
to its invocation
handler instance
503

A

FIG._5A

03-0984
Kar et al.
Method, System, and Product for Proxy-Based Method
Translations for Multiple Different Firmware Versions

6 / 8

A

FIG._5B

Are any of the method's parameters proxy instances? *504*

— Yes → Replace each actual parameter that is a proxy instance with its underlying firmware API instance *506*

↓

Replace each formal parameter that is a proxy instance with its underlying firmware API object type *508*

No ↓

All parameters now match parameter format for API method which is to be invoked *505*

↓

Find the firmware API method to call based on the Interface method's name and the formal parameter types *510*

↓

Using Java reflection, invoke the firmware API method passing it the actual parameters *512*

↓

Is the Interface method's return type an Interface? *514*

— Yes → Is the Interface method's return type an array? *518*

— Yes → Create a proxy instance that implements the Interface return type for each object in the array returned from the firmware API method call. Put the new proxy instance in a new array *524*

No ↓

Return the firmware API method's return object as the return value to the client *516*

No ↓

Create a proxy instance that implements the Interface return type for the object returned from the firmware API method call *520*

↓

Return the single proxy instance as the return value to the client *522*

↓

Return the array of proxy instance as the return value to the client *526*

03-0984
Kar et al.
Method, System, and Product for Proxy-Based Method
Translations for Multiple Different Firmware Versions

7 / 8

```
                    ┌──────────────┐
                    │    Start     │
                    │     600      │
                    └──────┬───────┘
                           │
                           ▼
                    ┌──────────────┐
                    │   Discover   │
                    │ Storage Array│
                    │     602      │
                    └──────┬───────┘
                           │
                           ▼
                    ┌──────────────┐
                    │Determine Version│
                    │  of Firmware │
                    │     604      │
                    └──────┬───────┘
                           │
                           ▼
                      ╱─────────╲
                     ╱   Does    ╲                    ┌──────────────────────┐
                    ╱ a Factory   ╲       No          │ Create a New Factory │
                   ╱ Proxy Instance ╲──────────────▶  │ Proxy Instance for the│
                    ╲ Exist for the ╱                 │Specified Firmware Version│
                     ╲Specified Version╱              │          608          │
                      ╲of Firmware?╱                  └──────────┬───────────┘
                       ╲   606   ╱                               │
                        ╲───────╱                               │
                    Yes │◀──────────────────────────────────────┘
                        ▼
```
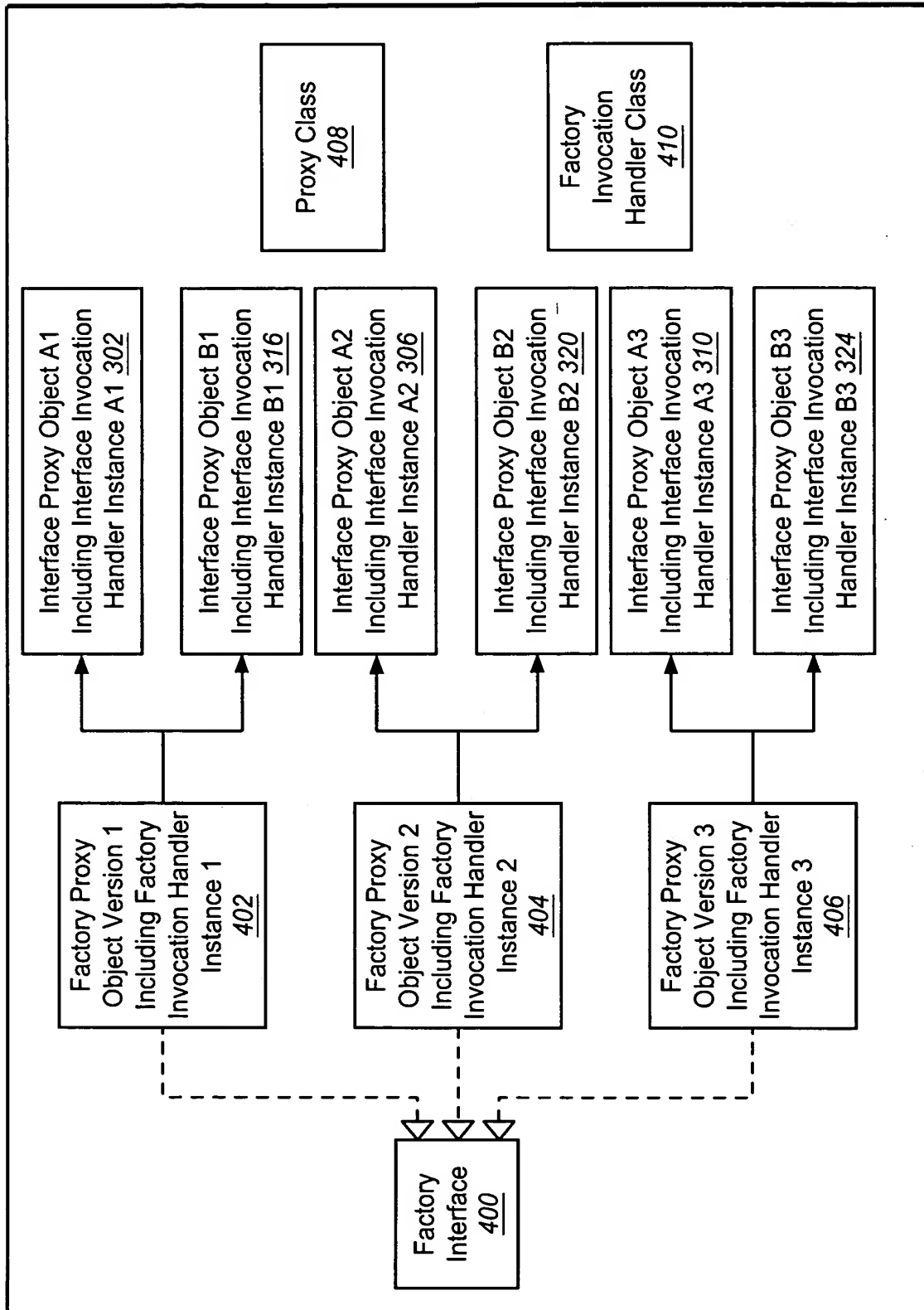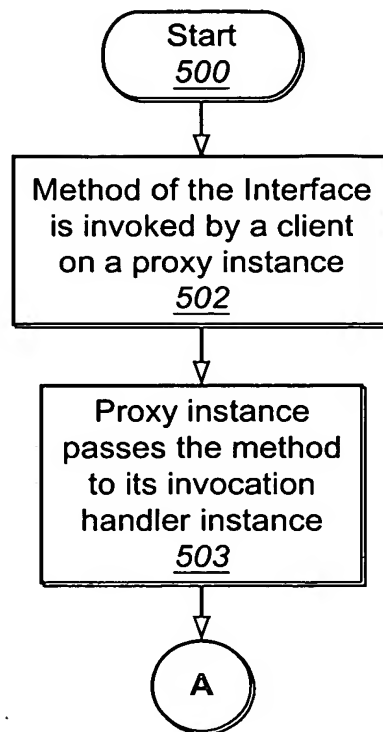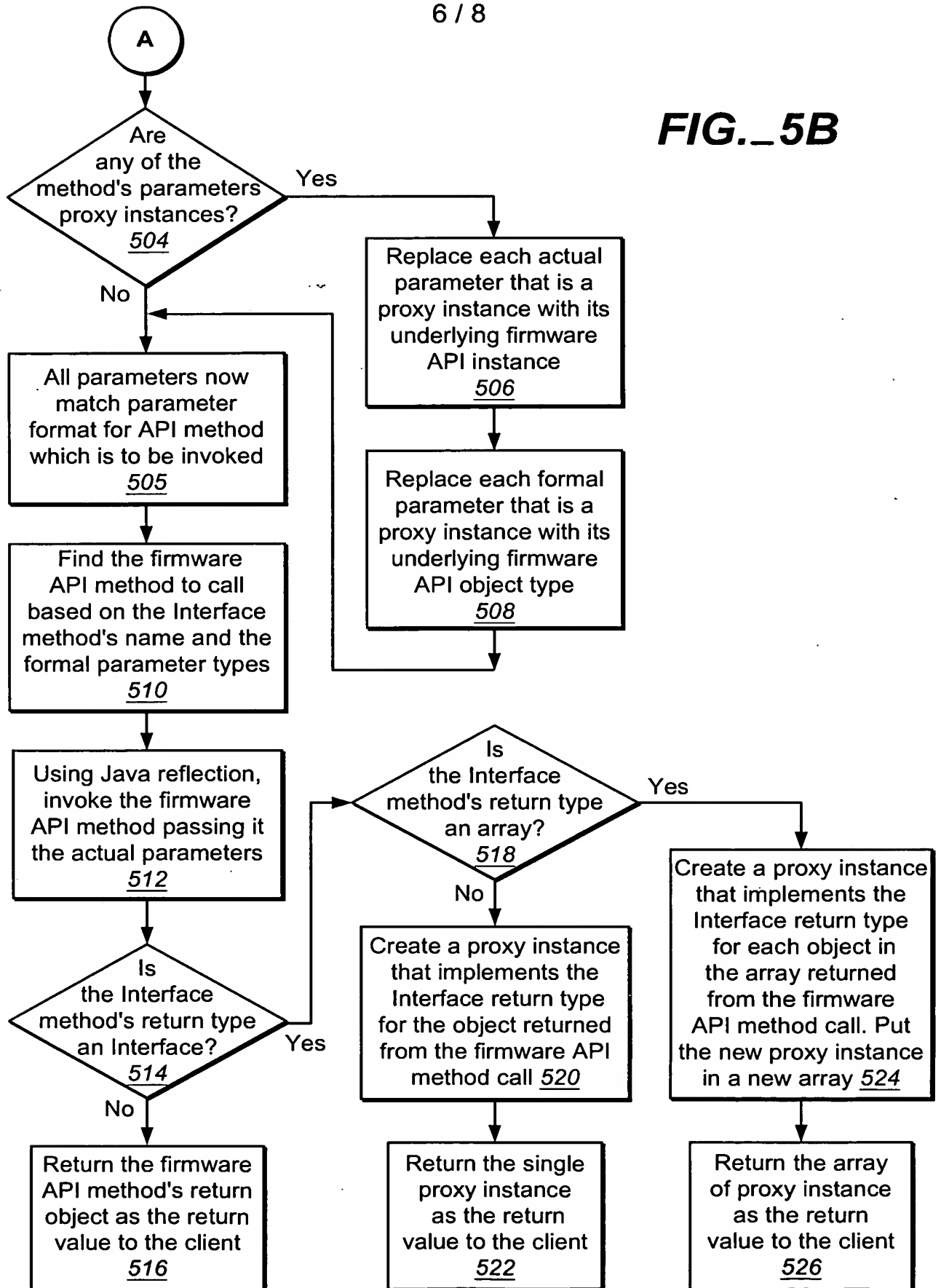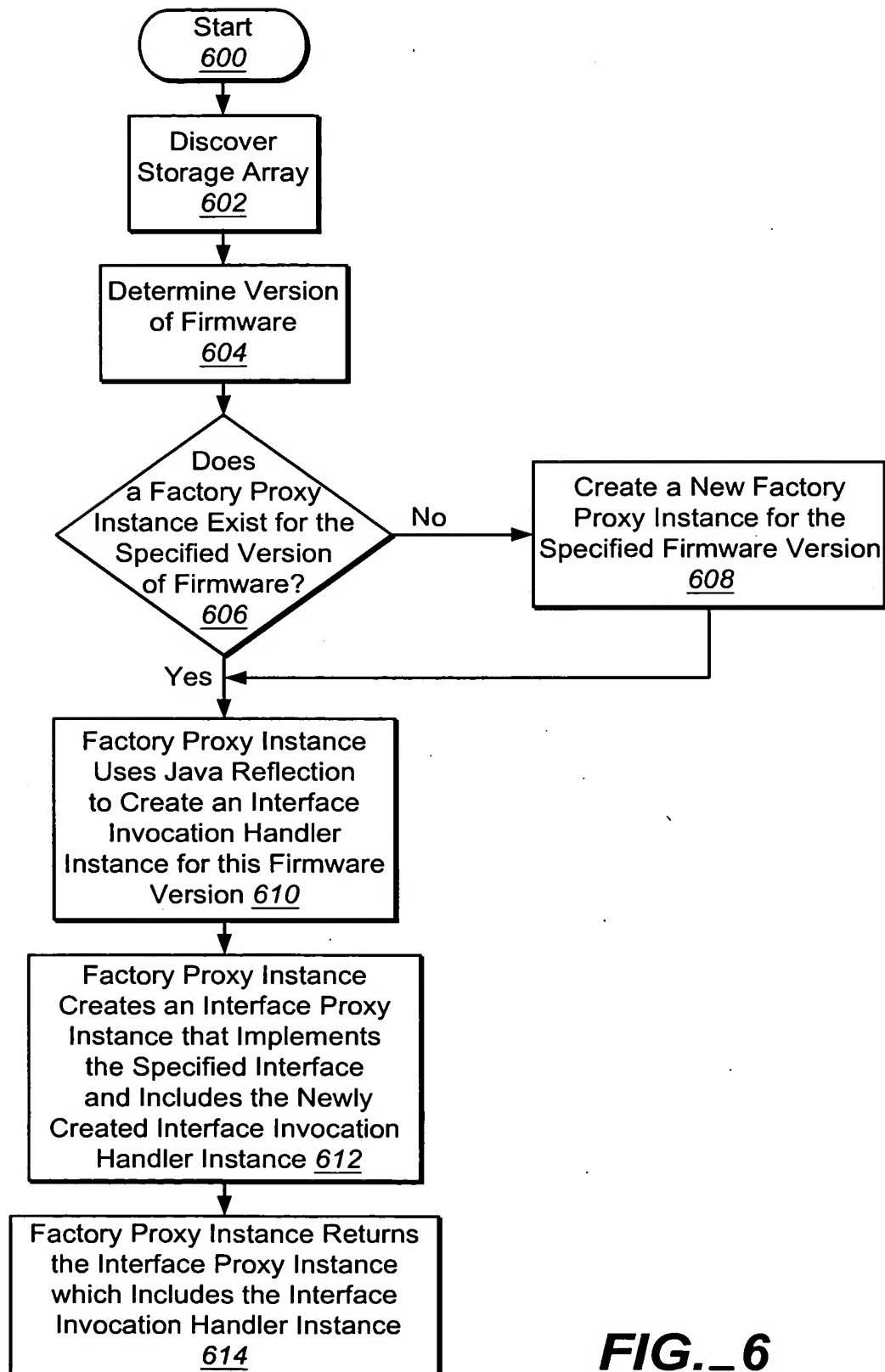
Does a Factory Proxy Instance Exist for the Specified Version of Firmware? 606

Create a New Factory Proxy Instance for the Specified Firmware Version 608

Factory Proxy Instance Uses Java Reflection to Create an Interface Invocation Handler Instance for this Firmware Version 610

Factory Proxy Instance Creates an Interface Proxy Instance that Implements the Specified Interface and Includes the Newly Created Interface Invocation Handler Instance 612

Factory Proxy Instance Returns the Interface Proxy Instance which Includes the Interface Invocation Handler Instance 614

FIG._6

03-0984
Kar et al.
Method, System, and Product for Proxy-Based Method
Translations for Multiple Different Firmware Versions

8 / 8

FIG._7